

WO 2004/056120 A1

10321 16 JUN 2004 16 JUN 2004

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau

(43) International Publication Date
1 July 2004 (01.07.2004)

PCT

(10) International Publication Number
WO 2004/056120 A1(51) International Patent Classification⁷: H04N 7/26 (74) Agents: LOISEL, Bertrand et al.; Cabinet Plasseraud, 65/67 rue de la Victoire, F-75440 Paris Cedex 09 (FR).(21) International Application Number:
PCT/EP2002/014903(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZW.(22) International Filing Date:
17 December 2002 (17.12.2002)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant (*for all designated States except US*): LET IT WAVE [FR/FR]; 27 rue Cécile Vallet, F-92340 Bourg-la-Reine (FR).(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(72) Inventors; and

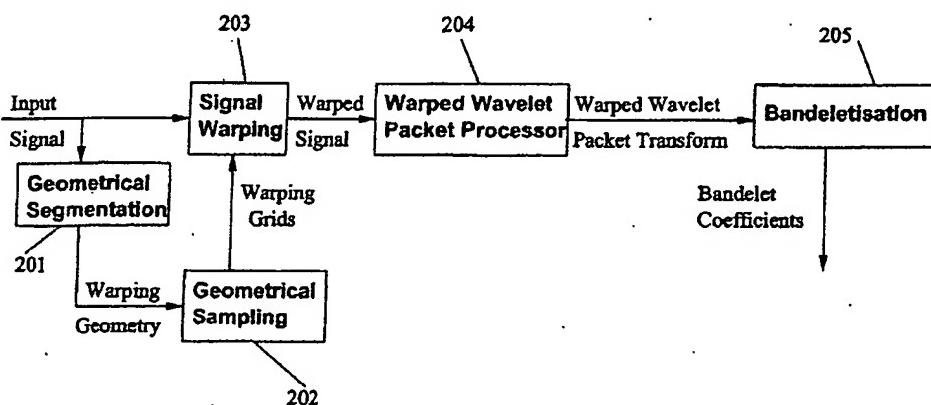
(75) Inventors/Applicants (*for US only*): BERNARD, Christophe [FR/FR]; 68, rue de la Fédération, F-75015 Paris (FR). KALIFA, Jérôme [FR/FR]; 4, rue Froidevaux, F-75014 Paris (FR). LE PENNEC, Erwan [FR/FR]; 41, avenue du Maine, F-75014 Paris (FR). MALLAT, Stéphane [FR/FR]; 11, rue Bonaparte, F-75006 Paris (FR).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PROCESSING OR COMPRESSING N-DIMENSIONAL SIGNALS WITH WARPED WAVELET PACKETS AND BANDELETS



(57) Abstract: A method and apparatus for processing or compressing an n-dimensional digital signal by constructing a sparse representation which takes advantage of the signal geometrical regularity. The invention comprises a warped wavelet packet transform which performs a cascade of warped subband filtering along warping grids of sampling points adapted to the signal geometry. It also comprises a bandeletisation which decorrelates the warped wavelet packet coefficients to produce a sparse representation. An inverse warped wavelet packet transform and an inverse bandeletisation reconstruct a signal from its bandelet representation. The invention comprises a compression system which quantizes and codes the bandelet representation, a decompression system, a restoration system which enhances a signal by filtering its bandelet representation, and a feature vector extraction system for pattern recognition applications of a bandelet representation.